

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
V SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

**Course Code: EE307**

**Course Name: SIGNAL AND SYSTEMS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks.*

Marks

- |   |  |     |
|---|--|-----|
| 1 | Differentiate between energy and power signals with example.   | (5) |
| 2 | Find the Laplace transform and ROC of the signal $x(t) = e^{-3t}u(t) + e^{-2t}u(t)$ .                                | (5) |
| 3 | State and prove Parseval's theorem for energy signals.   | (5) |
| 4 | Briefly explain zero order and first order hold circuits.  | (5) |
| 5 | Find the Z transform and ROC of the signal $x(n) = a^n u(n)$ .   | (5) |
| 6 | State and prove initial value theorem of Z transform.  | (5) |
| 7 | Find the convolution of the given signals using DTFT.<br>$x_1(n) = \frac{1}{2} u(n) \quad x_2(n) = \frac{1}{3} u(n)$ | (5) |
| 8 | Explain different types of nonlinearities present in the system.   | (5) |

**PART B**

*Answer any two full questions, each carries 10 marks.*

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|----|---|------|
| 9  | Explain the different types of signals with example.  | (10) |
| 10 | A continuous time LTI system is described by the differential equation $\frac{d^2 y(t)}{dt^2} + 7 \frac{dy(t)}{dt} + 12y(t) = x(t)$ . Determine the impulse response and step response given $y(0) = -2, y'(0) = 0$ . | (10) |
| 11 | Define LTI system. Check the causality, time invariance and linearity of the system $y(n) = x(n^2)$ .   | (10) |

**PART C**

*Answer any two full questions, each carries 10 marks.*

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|----|--|------|
| 12 | Obtain the trigonometric Fourier series representation of a full wave rectifier given $x(t) = \sin t$ .                            | (10) |
| 13 | a) What is meant by convolution sum? Find the convolution sum given $x(n) = 2\delta(n+1) - \delta(n) + \delta(n-1) + 3\delta(n-2)$ | (5)  |
|    | b) Find the Exponential Fourier Transform of $\cos \omega t$   | (5)  |

- 14 State and prove the properties of Fourier transform. (10)

**PART D**

*Answer any twofull questions, each carries 10 marks.*

- 15 Find the inverse z transform using residue method (10)

$$X(z) = \frac{1+3z^{-1}}{1+3z^{-1}+2z^{-2}}; |z|>2$$

- 16 a) Determine the DTFT of  $x(n) = 2^n u(n)$ . (6)

- b) Write a note on Random signals and random processes. (4)

- 17 a) Find the initial and final values of  $X(z) = \frac{z-2}{(z-1)(z-3)}$ . (5)

- b) Define Properties of Fourier Series ( any five) representation of Discrete Time Signals (5)

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